Civil Engineering

WETLANDS CONSTRUCTION AS MITIGATION

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Wetland Mitigation

- PURPOSE
- DESCRIPTION OF THE PROJECT
- AFFECTED WETLANDS
- DESCRIPTION OF THE MITIGATION AREA
- MITIGATION DESIGN
- RESULTS
- OTHER RECENT MITIGATION

Purpose:

- Provide information on mitigation procedures for construction in wetlands
- Provide background on project
- Provide construction information
- Show results
- Discuss ongoing mitigation project

Project Description

- **Mitigation Location: Estuary on the Florida Gulf Coast**
- **Projects to be mitigated**
  - **Wetland filling in four different locations on base**
  - **Filling 17 acres of freshwater hardwood wetlands**
    - **Some isolated wetlands**
    - **Wetlands above the headwaters of a stream impacted prior to seventies by roadway.**

Affected Wetlands

- Fill Projects Affected two types of freshwater wetlands
  - Isolated broad leaved deciduous shrub and pine Titi swamp
    - Vegetation
      - Titi Cliftonia monophylla, Cyrilla racemiflora
      - Slash Pine Pinus elliotti
  - Broad Leafed deciduous forested wetland and pine
    - Vegetation
      - Magnolia Magnolia grandiflora
      - Sweet bay magnolia Magnolia virginiana
      - Red bay Persea berbona
      - Titi Cliftonia monophylla, Cyrilla racemiflora
      - Black gum Nyssa sylvatica
      - Cypress Taxodium ascendens

Mitigation Design

- Wetland functions to be replaced or restored
- Replace forested hardwood swamp and shrub deciduous swamp
  - Create similar swamp habitat
- Functions DESIRED
  - Energy export through detrital food web
  - Food source for invertebrates
  - Habitat for reptiles, amphibians, birds and small mammals

Mitigation Design

- Site evaluations
  - Searched for uplands on base to be converted into freshwater wetlands
  - Existing uplands pristine pine flatwoods-FWS “not recommended”
  - Land acquisition – not feasible due to policy at the time
  - Estuarine marsh – site available on base
    - Pros
      - Shoreline –un-vegetated sandy shore and 250 foot seawall
      - No vegetation
    - Cons
      - Barge traffic creating severe waves parallel to shoreline
      - Erosion undermining trees, archeological sites
      - Coordination and permits necessary

Description of Mitigation Area

- Mitigation Area approximately 4.7 acres on Santa Rosa Sound
- Estuarine ecosystem
- Eroding shoreline at two locations
  - 70 feet of erosion along approx 1000 linear feet of beach in Santa Rosa Sound
  - Erosion causing destruction of archaeological sites
  - Seawall installed in mid 80s which caused further erosion at ends of wall
  - Erosion result of prevailing south winds, ship and boat traffic
    - Intra-coastal waterway channel
    - No endemic vegetation

Eroded shoreline in area

Mitigation Design

- Functions desired
  - Tidal marsh ecosystem
  - Protect uplands from erosion
  - Provide habitat for estuarine species
  - Provide nursery areas for estuarine species
  - Provide high value vegetation for detrital food web
  - Provide methods for export of detritus/interchange of tidal waters
  - Provide feeding areas for fish, birds and invertebrates

Mitigation Design

- Vegetation
- Mimic natural systems in the area
- Use combination of littoral species
- Optimize elevations for planting
- Vegetation in area
  - Smooth cordgrass Spartina alterniflora
  - Black needlerush Juncus roemerianus
  - Saltmeadow cordgrass Spartina patens

Mitigation Design

- Elevations
- Mimic natural systems in the area
  - Elevations of the existing vegetation in the area were taken to optimize planting success
  - Cross sectional design included a stone rip rap barrier of sufficient size to insure good water flow but of sufficient height to act as a wave attenuator
  - Elevations were varied to create shallow and deep intertidal areas

Mitigation Construction

- Breakwater constructed first
- Fill - clean sand fill installed to match the design elevations
- Planting
  - Plant sprigs from a local supplier were installed by contractor on 18 inch centers in the spring of the year
  - Hurricane Opal destroyed one of the two planted areas in November of 1995
  - Elevations had to be re-established and area had to be replanted

Mitigation Costs

- Initial Costs
- 4.7 acres – $350k
- 2.3 acres refilled, graded and replanted - $150k
- Total Cost - $500k

Results – Eastern marsh

Results - Western marsh

Western marsh ecotone

Western marsh ponded area

Ongoing Mitigation Project 4.3 ac

Ongoing mitigation high tide

Ongoing mitigation low tide

Ongoing mitigation tidal creek

Ongoing mitigation existing vegetation, shallow area, rip rap

Last slide – Questions?